Broadleaf Weed Control in Sorghum

Trial ID: **LB2016** **Location:** **Allora** **Trial Year:** **2021**
Investigator: **Linda Bailey**

This trial was designed to evaluate herbicide options for the knockdown control of 'hard to kill' weeds in grain sorghum. Weeds in the *Tribulus* genus e.g. caltrop and yellow vine are often poorly controlled by atrazine plus starane (common industry standard herbicide mixture).

To broaden the range of herbicides that could be evaluated, this trial was conducted in an imidazolinone tolerant sorghum hybrid. This allowed the comparison of an imi herbicide alone or in mixture with chemistry registered for conventional sorghum hybrids. Although this approach increased the herbicide range for evaluation, the constraint of finding weedy sites in Sentinel IG crops restricted the options for suitable sites. The primary weed in this trial was fierce thornapple with only trace levels of yellow vine (*Tribulus micrococcus*) present. During trial assessment it was clear that the distribution of yellow vine was too low for reliable conclusions. This data is not presented.

Objective:	**To screen herbicide combinations for control of broadleaf weeds in sorghum**
Crop:	**Sorghum - Sentinel IG**
Planting Date:	**26/12/2020**
Row Spacing:	**76 cm**
Application Date:	**03/02/2020 (39 days after planting)**
Crop Stage at Application:	**70cm high (50% 4 tillers)**
Target Weed:	**Fierce Thornapple**
Weed Stage at Application:	**40 cm tall, 30 cm diameter**
Weed Density:	**~1/m^2**
Nozzles:	**AIXR110015**
Volume:	**70 L/ha**
Keywords:	**Sorghum, fierce thornapple**

Application timing

The trial site was located and pegged in a commercial crop of Sentinel IG in mid Jan 2021. The crop had a population of ~92,000 plants/ha and was at the 4-6 leaf stage. A combination of rainfall events and an electrical issue with the spray unit delayed application by 19 days. At application, the crop was ~70cm tall and between vegetative stage 3 and 4 (most advanced plants just prior to flag leaf emergence). The delay also resulted in much larger weed stages being targeted than planned or on label.

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Pest Scientific Name			*Datura ferox*			
Pest Name			Fierce Thornapple			
Assessment Date			16/02/2021	16/02/2021	3/03/2021	3/03/2021
Assessment Type			BURNDOWN	BIOMASS REDUCTION	COUNT	BIOMASS REDUCTION
Assessment Unit			%	%	/m²	%
Treatment-Evaluation Interval			13 DAA	13 DAA	28 DAA	28 DAA
ARM Action Codes			IID	IID	AA	AA
Trt No.	Treatment	Product Rate				
1	Intercept*	750ml/ha	33ef	23ef	0.06def	98abc
	Hasten	0.5% v/v				
2	Intercept	1000ml/ha	37de	27ef	0.13c-f	98abc
	Hasten	0.5% v/v				
3	Intercept	1000ml/ha	33ef	40b-e	0.60abc	94c
	Garlon 600	80ml/ha				
	Hasten	0.5% v/v				
4	Intercept	1000ml/ha	57bcd	50bc	0.19b-f	95bc
	Starane Advanced	450ml/ha				
	Hasten	0.5% v/v				
5	Intercept	1000ml/ha	57bcd	47bcd	0.10def	95bc
	Gesaprim Granules 900 WG	2000g/ha				
	Hasten	0.5% v/v				
6	Gesaprim Granules 900 WG	2000g/ha	73ab	57ab	0.02ef	99ab
	Starane Advanced	450ml/ha				
	Hasten	0.5% v/v				
7	Terbyne Xtreme 875 WG	1200g/ha	23efg	20fg	0.04def	67d
	Hasten	0.5% v/v				
8	Intercept	1000ml/ha	80a	70a	0.16c-f	95bc
	Terbyne Xtreme 875 WG	1200g/ha				
	Hasten	0.5% v/v				
9	Dual Gold	1000ml/ha	10g	0h	0.86a	0e
10	Intercept	1000ml/ha	40cde	23ef	0.42a-d	95bc
	Dual Gold	1000ml/ha				
	Hasten	0.5% v/v				
11	Bromicide 200	2000ml/ha	67ab	57ab	0.00f	100a
12	Intercept	1000ml/ha	27efg	17fgh	0.01f	99ab
	Bromicide 200	2000ml/ha				
	Hasten	0.5% v/v				
13	Tordon 75-D	500ml/ha	60abc	50bc	0.33a-e	95bc
14	Intercept	1000ml/ha	40cde	30def	0.79ab	95bc
	Tordon 75-D	500ml/ha				
	Hasten	0.5% v/v				
15	MCPA 250 Selective	1400ml/ha	13fg	3gh	0.41a-d	78d
16	Intercept	1000ml/ha	43cde	33c-f	0.18c-f	92c
	MCPA 250 Selective	1400ml/ha				
	Hasten	0.5% v/v				
		LSD P=	20.2	18.7	2.605t	10.0t
		Treatment Prob.(F)=	0.0001	0.0001	0.0045	0.0001

Means followed by same letter do not significantly differ (P=.05, LSD)
t=Mean descriptions are reported in transformed data units, and are not de-transformed.
Mean comparisons performed only when AOV Treatment P (F) is significant at mean comparison OSL.
Missing data estimates are included in all columns

NB * the registered product for use in imi tolerant sorghum is Intervix® (33g/L imazamox + 15g/L imazapyr). Intervix supplies were unable to be sourced for this trial and Intercept® (33g/L imazamox + 15g/L imazapyr) was substituted. Intercept is only registered for use in imi tolerant barley, canola and lentils.

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Assessment Type
BURNDOWN = % Burndown - brownout
BIOMASS REDUCTION = % Biomass reduction/burndown
ARM Action Codes
AA = Automatic arcsine square root % transformation
IID = Identically Independent Distributed. Analyze data as if it met all the assumptions of AOV.

DAA = Days after Application

Conclusions:

This trial was established to screen alternative chemistry options for sorghum weed management and conducted in an imidazolinone herbicide tolerant (imi-tolerant) sorghum hybrid. Treatments included imidazolinone treatments alone and in mixture with herbicides registered in conventional sorghum. Gesaprim 900 WG at 2000 g/ha + Starane Advanced 450 mL/ha + Hasten 0.5% was used as a benchmark with no untreated included.

The trial was conducted on fierce thornapple at ~1/m^2 (first side shoot visible, ~40 cm tall) in Sentinel IG sorghum. The sorghum was ~70 cm tall and ~ 1 week prior to flag leaf emergence (vegetative stage 4). Burndown and biomass reduction visual ratings were conducted at 13 days after application (13 DAA) with final weed assessment at 28 DAA.

At 13 DAA, Intercept + Terbyne Xtreme + Hasten provided the highest level of fierce thornapple burndown (80%) and biomass reduction (70%) but was not significantly different to the benchmark treatment of Gesaprim + Starane Advanced. Intercept alone provided low levels of suppression at this time with no obvious rate response. There was no apparent effect from Dual Gold alone on fierce thornapple.

Counts of surviving weeds were made at 28 DAA with a transect of 1m x 10m in each plot. Bromicide alone provided complete control with very high levels of control from the Intercept + Bromicide mixture and Gesaprim + Starane Advanced benchmark treatment. Treatments significantly poorer than Bromicide alone were Dual Gold, Tordon 75D and MCPA individually or tank mixtures of Intercept with Garlon or Dual Gold. There was no apparent Intercept rate response. In this situation, on large fierce thornapple, the addition of Tordon 75D to Intercept significantly antagonised control with concerning trends also apparent from mixtures of Garlon or Dual Gold with Intercept.

Visual biomass reduction was also rated at 28 DAA. Similar results were apparent with Intercept + Bromicide, Gesaprim + Starane and Intercept alone all rated as providing a minimum of 98% biomass reduction and not significantly different to Bromicide alone (100%). Treatments significantly poorer for biomass reduction than the Gesaprim + Starane Advanced benchmark treatment were Dual Gold, Terbyne Xtreme and MCPA individually or tank mixtures of Intercept with Garlon or MCPA. There was no apparent Intercept rate response.

No reliable yellow vine control data was generated in this trial. Evaluation of alternative chemistry on large fierce thornapple plants showed highest levels of control from Bromicide alone or in mixture with Intercept, Gesaprim + Starane Advanced and both rates of Intercept alone. Further evaluation of Intercept mixtures may be warranted to identify whether the apparent antagonism in mixtures with Tordon 75D, Garlon or MCPA is repeatable.

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Application Description	
Application Date:	3/02/2021
Application Start Time:	11:45 AM
Application Stop Time:	2:30 PM
Application Method:	SPRAY
Application Timing:	LATE POST-EM
Application Placement:	FOLIAR
Applied By:	L Bailey
Air Temperature, Unit:	29.4 C
% Relative Humidity:	47.6
Wind Velocity, Unit:	10.4 km/h
Wind Direction:	NE
Soil Moisture:	DRY
% Cloud Cover:	60
Next Moisture Occurred On:	14/02/2021

Crop Stage at Application		
Crop:	Sorghum Sentinel IG	
Stage Scale Used:	BBCH	
Stage Majority, %:	24	50%
Stage Minimum, %:	22	20%
Stage Maximum, %:	25	10%
Diameter, Unit:	30 cm	
Height, Unit:	70 cm	

Sorghum at ~ stage 3-4 vegetative phase at spraying

Pest Stage at Each Application		
Weed:	*Datura ferox* Fierce Thornapple	
Stage Majority, %:	6-10 leaf	50%
Stage Minimum, %:	4-6 leaf	10%
Stage Maximum, %:	6-10 leaf	50%
Diameter, Unit:	30 cm	
Height, Unit:	40 cm	
Density, Unit:	1 /m^2	

Application Equipment	
Application Equipment:	Polaris
Equipment Type:	BOOM
Operation Pressure, Unit:	300 kPa
Nozzle Type:	AIXR
Nozzle Size:	110015
Nozzle Spacing, Unit:	50 cm
Nozzles/Row:	8
Boom Length, Unit:	4 m
Boom Height, Unit:	80 cm
Ground Speed, Unit:	10.3 km/h
Spray Volume, Unit:	70 L/ha